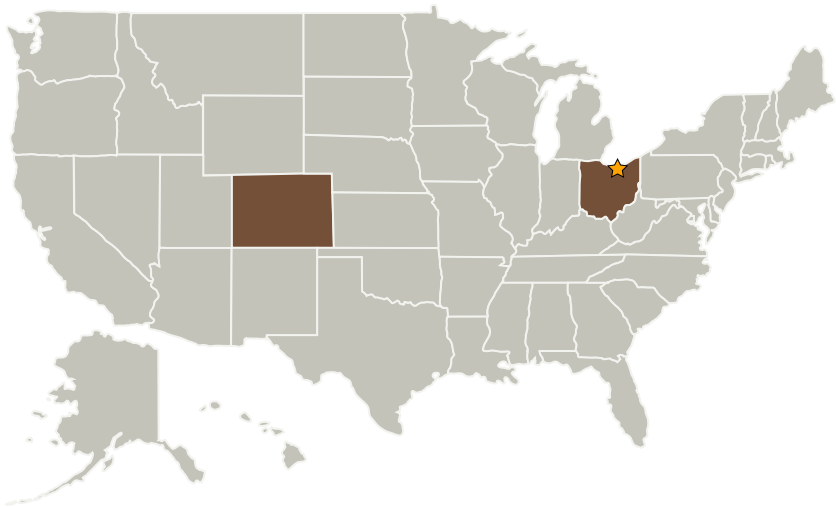
A Novel Cyclic Catalytic Reformer for Hydrocarbon Fuels, Phase I

Completed Technology Project (2006 - 2006)

Project Introduction

This proposed Small Business Innovative Research (SBIR) Phase I addresses development of a compact reformer system based on a cyclic partial oxidation (POx) technology for the purpose of generating hydrogen for fuel cell systems. The need for improved reformers arises from: 1) the tendency of hydrocarbon fuels to deposit carbon on surfaces; 2) requirement of large quantities of steam; 3) a massive and voluminous fuel desulfurization stage; 4) substantial size and power consumption requirements; and 5) the lack of efficient, robust, and compact hydrogen separation technology. These issues will be addressed by employment of a fixed bed cyclic redox system utilizing a metal oxide oxygen carrier for partial oxidation of fuel. The reformer will consist of a small heated bed of sulfur tolerant partial oxidation catalyst and will operate by alternate exposure to air and vaporized fuel. Carbon deposition and steam requirements and, possibly, the need for a prereformer will be reduced or eliminated by this cyclic mode. This cyclic operation will also eliminate the need for an expensive air separation unit or for H2/N2 separation. Phase I will consist of identification of catalysts, testing under cyclic conditions with real fuel, and integration of reformer and hydrogen separation modules. On the basis of Phase I data, a prototype system will be designed, fabricated, and tested during Phase II.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
Eltron Research & Development, Inc.	Supporting Organization	Industry	Boulder, Colorado

Primary U.S. Work Locations	
Colorado	Ohio

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.3 Aero Propulsion
    - TX01.3.12 Alternative Low Carbon Jet Fuel